

The field hockey hit uses a two-handed swinging motion to produce high ball velocity for a shot at goal or a long-distance pass. Despite its importance, there have been few quantitative studies of the hit. The purpose of this study was to investigate a number of kinematic and kinetic aspects of the stick's motion, forming a starting point for informed discussion of the technique.

Thirteen female NCAA Division I varsity field hockey players and coaches served as subjects. Subjects executed hits in which they were allowed to take one approach step. Three-dimensional motion analysis of the stick and hands served as the basis for three studies.

The first study investigated how the shape of the backswing affected the stick motion during the subsequent downswing. The stickface speed at impact was higher in the seven subjects who used a looped backswing (36.6 ± 1.6 m/s) than in the six subjects who used a straight backswing (29.1 ± 3.5 m/s), as a result of a larger speed at the start of the downswing and a tendency to add a larger amount of speed during the downswing.

The second study introduced a new method for locating the planar portions of a swinging motion. Analysis of the path of the stickface during the downswing showed that the path was nearly planar for the last $82 \pm 13\%$ of its length.

In the final study, a new model was developed for quantifying the contributions of applied forces and torques, including those made by the hands, to the speed of a swinging implement. The model was applied to the downswing of the field hockey hit. The main contributors to the speed at impact of a point at the distal end of the stick's longitudinal axis were the force made by the hands along the length of the stick ($51 \pm 6\%$ of the speed at impact) and the torque applied by the hands about an axis perpendicular to the shaft of the stick ($46 \pm 16\%$). The force applied perpendicular to the shaft made a negative contribution ($-11 \pm 9\%$).